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TUBERCULOSIS.

By DR. BURTON R. ROGERS, Agricultural College, Manhattan.

In all civilized countries there is a preventable disease which has been and is the cause, and the only cause, of the death of ten per cent. of our people. If we knew no more concerning the white man's plague to-day than we did prior to 1880, nine million of the ninety million people living in this country to-day would die of this disease. If we do not grasp and profit by the facts we know to-day the same will be true in the future.

But the most magnificent and most beautiful star in the medical and scientific firmament of to-day is that this disease is preventable and largely curable.

The only direct cause of tuberculosis is the entrance of the tuberculosis germ into a living body. Tuberculosis is absolutely impossible without the germ, as a corn-field is impossible without seeds of corn. Therefore the proposition is, where do the germs come from, and how may they be exterminated?

More than ninety-five per cent. of them come from two sources, namely, from the undestroyed sputum of tuberculous people and the unprepared food products of tuberculous animals. There are many varied opinions as to which of these two sources produces the larger per cent., the majority having held for a long time that the bulk of human tuberculosis is due to the dried sputum of careless or ignorant tuberculous people being inhaled.

Conscientiously I cannot concur in this, for I believe Nature has so constructed the air-passages that very few diseases can be produced by inhalation, for it contains moist angles that make a winding, rather than a direct, course for the inspired and expired air. The beautiful result is that, while the volume of air itself may follow a curved course, deflected here and there till it reaches the air-cells of the lungs, the particles, including germ life of all kinds, strike the moist angles, to which they adhere. It is similar to fanning dust into two curved stovepipes, one dry, the other lined by a moist cloth.

The cilia of the cells of the respiratory mucous membrane then convey them to channels through which they can be expelled to the exterior. Foreign material thus reaching the

pharynx produces the reaction of either expectoration or swallowing. For this reason germs going in or out strike the most pronounced moist curve at the pharynx, producing that extraordinarily fortunate impossibility of germs being passed out to the exterior in ordinary expiration. Otherwise nearly every public room and public gathering would be unsafe. Because of this simple fact alone, it is within the will-power of properly educated tuberculous persons to collect practically every tuberculous germ which they give off, and, by destroying them, prevent the spread of the disease from one person to another. The cough, the sneeze and the expectoration are abnormally forcible and accelerated forms of expiration that carry out the germs, and while indoors the handkerchief at the nose and mouth collects practically all of them, so he can destroy them. Thus constant association with the educated tuberculous person is safe—but it is a positive menace with the one who does not know this fact.

But I am not here to discuss the intertransmissibility of human tuberculosis between man and man.

During a recent summer, while a federal meat inspector in the only packing-house in a city of 18,000, and to which the farmers for fifteen miles around hauled their hogs direct to this packer, I tagged 3430 of these hogs before the farmer had unloaded them from his wagon. As a result, when slaughtered I was able to trace back to the owner all tuberculous hogs and thus get a history and opportunity for an investigation of contributory causes.

Of about 600 different hog raisers, only 39 brought in all of the tuberculous hogs, and of these I only wish to mention two as pertinent and serious examples.

Every time a certain man brought in hogs, every single one of them was badly affected with intestinal and generalized tuberculosis. The filter system of the alimentary tract was so over-distended that it was positive evidence the food of the animal was mixed with tuberculous germs. Mesenteric lymphatic glands that should be as small as peas were as large as one's fist.

He informed me, and I confirmed it in several ways, that he was hauling to his farm the surplus milk from a milk store located in the same block in which I lived. Being milk too old for sale, it could be used for no other purpose than for feeding to hogs.

Gentlemen, the milk of cows that would produce this condition in hogs was sold for human consumption. We know that hogs can eat that which man cannot.

The other instance was that of the local country butcher having no inspection in an adjacent village, and who fed the lungs and other offal of the few animals he slaughtered to his omnivorous hogs. One hundred per cent. of his hogs showed equally bad intestinal tuberculosis. Several other dairymen and local slaughter-houses revealed the same conditions, to a lesser degree. Unless conditions are positively known to be otherwise, the very same conditions may exist in any community in the United States.

It is an actual and indisputable fact that if every tuberculous germ that has been given off or will be given off from the tuberculous people and animals living at the present time could be secured and effectually destroyed, or be merely prevented from entering a living body, the last death that would occur from tuberculosis would be in a person or animal in the present generation. I have shown it to be within the will-power of educated tuberculous persons to prevent infecting other persons and be their brother's keeper rather than destroyer.

Since domestic food-animals have very little mental power, it follows that the disease must be completely eradicated from them. Cattle do not expectorate—they slobber and swallow instead. The germs thus coughed up from the lungs are swallowed and those that are not again reabsorbed are passed out with the faeces. Farmers have found it economical to have hogs secure a portion of their nutrition from the faeces of the cattle.

When the cattle are tuberculous the hogs also acquire the disease. Thus tuberculous hogs are an index to dangerous tuberculous cattle and other tuberculous hogs.

It has been claimed recently that when the manure of tuberculous cattle dries within the stable it becomes dust, and portions of it, together with tuberculous germs, drop into the milk, which, if still retained at the temperature of the cow, offers the finest of opportunities for the tuberculous germs to grow, live, and multiply. A few germs at the time of milking may become several hundred at time of drinking.

The methods by which tuberculosis is transmitted from one animal to another or from one species to another can be re-

duced to three sources: *First*, animals living beneath the same roof can acquire it of each other. Cattle very seldom acquire the disease from other cattle in the pasture or even in the open feed-lot. Therefore, it is positively true that the disease is never carried through the air from one farm to another. However, by a *second* method, hogs may acquire the disease from tuberculous cattle by being turned into the feed-lot and eating the manure. Manure is an organic nutritive substance which, when first dropped, equals the body temperature and is favorable to the growth of the tuberculous germs. By a *third* method, hogs may acquire tuberculosis from the milk of tuberculous cows on the same premises. Therefore, if hogs never received any food, milk or manure, except that from the animals on the farm of the owner of the hogs, we would have an index at the packing-houses slaughtering hogs to practically every farm in this country having the tuberculous animals upon them. Manure is seldom hauled from one farm to another except for fertilizer.

Now, here is the important point: An exceedingly good animal husbandman can prepare a hog ready for market at six months of age; and nearly every hog, except parents, going to market is less than one year of age. Therefore, practically every farm in this country, before one year from to-day, will have sent one or more hogs to market.

The beauty of these facts is that the bulk of hogs are slaughtered in packing-houses where government veterinarians make two thorough examinations for tuberculosis of every hog killed.

The natural result would be that if they knew the farm from which every tuberculous hog came, we would, inside of one short year, know every farm having dangerous tuberculous animals upon it. The results would almost equal the tuberculin test applied on every farm in the country.

Human physicians advocate the registration of every tuberculous person and their place of habitation. Very recently I publicly proposed a detailed plan for accomplishing this much-desired result in animals.

But does tuberculosis exist in many animals?

The public animal reports of the government show that just in packing-houses alone having United States inspection, 15,546 tuberculous animals were detected in 1901, 27,752 were detected in 1902, and 81,179 were detected in 1903; and most

certainly a like proportionate increase in the subsequent years, especially since the new law by which the inspection has been extended, and since nothing has been done to eradicate the disease.

The total number slaughtered during the three years was 113,630,682, thus making a smaller percentage than in any other country.

As many as 72,000 hogs have come into the Chicago stock-yards in a single day and been offered for sale. A tuberculous hog looks absolutely no different from a healthful animal. After these hogs have been bought, individual packers sometimes purchasing more than 15,000 on a single day; no farmer would be able to pick out his own hogs after they have been mixed together, let alone picking them out after they have been slaughtered and their hair removed. Packers thus buy tuberculous animals unconsciously, and if conditions are not changed they will continue to do so.

At the present time the general per cent. for the entire country is less than three in the hogs slaughtered where government inspection exists. A conservative estimate, based upon these facts and upon the experiment which I carried out, is that less than six per cent. of the farms of this country are sending all the tuberculous animals to market. Less than six per cent. of the farms are thus likewise responsible for all the tuberculous dairy products.

One simple thing will be the means of ascertaining the location of all of the small yet dangerous six per cent. of farms having tuberculous animals upon them—and that is to securely tag all hogs sent to market with tags that will remain until they have been inspected by the federal inspector.

I propose a letter from each state suffixing or prefixing a number for each county in each state, the combination being the numerator of a fraction; the denominator being a number given to the individual farmers in each state, as

$$\frac{a \ 26 \ 27 \ d}{833 \ , \ 1005} \text{ etc.}$$

But what shall be done after discovering the location of the tuberculous farms?

In the past irrational and radical people, so-called scientists, too, have advocated going to the farm and slaughtering all of the tuberculous animals, if need be, at the owner's expense, for they are a menace to the public health and he has

no business owning them. Gentlemen, I know of no single factor which has been a greater hindrance to the eradication of animal tuberculosis than this. Many times the carrying out of such an edict would financially ruin the small accumulation of a hard-working man.

You will, no doubt, believe that it would be to the packers' benefit to completely eradicate tuberculosis from domestic food animals, and it must seem reasonable to you that he would want to cooperate with the farmer and do all in his power to reach such an end.

All the tuberculous animals coming to market this year came from farms on which the conditions continue to be favorable for acquiring tuberculosis by the hogs that are still on those farms and those that will be there next year and next year and next year and next year. Some of the tuberculous animals marketed this year caused it in the younger animals on the same farm that will be marketed next year. In fact, unless something is done, all coming from those farms will be tied to the same string forever.

So next year the packers will buy unconsciously, at the same price and at the same loss, animals that they could buy consciously at the same price and certainly without greater loss.

If the farmers of this country could sell all of their present tuberculous animals at full market values, and thus without one cent of loss, and the packers could buy them consciously with no greater loss than if bought unconsciously, the putting of two and two together is that animal tuberculosis could be totally eradicated from this country within a space of two years and without one cent of loss or cost.

Can you conceive of anything more remarkable, when all along every one has contended that it would take years and an immense sum of money to accomplish this result?

Indeed, I can prove to you that it would be at a profit to the packer, to the farmer, to the consumer, to the entire country, and to the whole world.

The eradication or the control of the animals that are at present tuberculous means the eradication of the animal tuberculous germ manufacturing establishments. This, together with the will-power of the educated tuberculous person, means the complete eradication of the disease. Not only is it eradicated without loss or cost on the part of the packer,

farmer, consumer and the entire country, but it likewise yields an immense profit to all.

Tuberculosis seldom dies out spontaneously from a farm. It is only by the act of man that such a thing occurs. If all other present conditions remain the same and nothing is done concerning tuberculosis, the present less than six per cent. will soon become more than seven per cent., and then eight per cent., and so on, for tuberculosis spreads from tuberculous animals on one farm to the previously healthful animals on another farm by two methods only. First, either at public auction or private sale tuberculous animals are bought consciously, or, more frequently, unconsciously, and placed in previously healthful quarters and among previously healthful animals, and with the very same disastrous results from the association explained heretofore. Secondly, by the food products, especially milk of tuberculous cows on one or more farms being taken to the local creamery and mixed with the entire skim-milk product of the creamery. Thus all the farmers hauling back this skim-milk carry infection to their own hogs, the majority of which were previously healthful. Thus new source-centers are started, and just as a few years ago we could probably say less than four per cent. of the farms had tuberculous animals upon them, in a few more years we cannot even say less than six per cent. Each of the present six per cent. of farms will become more saturated with the disease. Thus the percentage of tuberculous animals on the farms will increase above six per cent. and the per cent. of farms will increase.

Let me relate what we have suffered and lost in not adopting my plan June 30, 1906, seventeen months ago, when the famous meat-inspection bill became a law.

Since that time nearly, and probably, every farmer in the country has marketed one or more hogs, several hundred thousand of them being tuberculous. Had the hogs been tagged we would to-day know where practically every tuberculous animal in the country is now located. Conversely we would know nearly every animal that was free from tuberculosis.

Since that time, tuberculous animals that would be either dead or under control to-day have been bought, are being bought, and will be bought at private and public sales, and have been taken to healthful farms and among healthy cattle.

Since that time, tuberculous animals that would be either

dead or under control to-day have supplied, are supplying and will continue to supply creameries with milk that when skimmed has gone, is going and will go to other farms and infect other animals.

Since that time, tuberculous animals that would have gone to the larger packing-houses and been properly disposed of have been, are being, and will continue to be slaughtered in local country and town slaughtering-houses and be eaten by man.

Since that time, tuberculous cows that would now be dead or under control have been, are, and will continue, supplying the milk to the creamery, and thus contaminate the entire product of that creamery.

Since that time, tuberculous cows that would now be dead or under control have been, are, and will continue, supplying raw, uncooked milk to adults, children, invalids and infants, much of it under the physician's directions.

Since that time, individuals have taken into their system the germs that will cause them to be a part of a per cent. that we do not know of the 100,000 that died last year, a share of the 100,000 that will die next year, and an unknown portion of the 2,500,000 that will die within the next twenty-five years. Every day's delay means the sacrifice of human life.

And what would the plan have accomplished and gained for us had it been accepted and adopted June 30, 1906?

It would have practically eradicated animal tuberculosis from this country. It would have been a monumental achievement for America. It would give a reputation to American meat and dairy products unequaled by any country in the world, and thus increased instead of decreased our exports.

In 1901 Robert Koch made the startling statement that man could not acquire tuberculosis from animals, and the whole scientific world took up the subject and much time and money has since been expended in attempting to solve the problem.

The plan I propose, while eradicating the disease from animals would make the problem immaterial, and therefore eradicate both the disease and the problem.

At one stroke the problem of the milk-supply of towns and cities would be solved as far as tuberculosis is concerned.

At one stroke the problem of municipal and country slaughter-house inspection would be solved, as far as tuberculosis

is concerned. Over ninety-five per cent. of condemnations in packing-houses having federal inspection is for tuberculosis.

Gentlemen! Several years ago the meat loss estimated by Dr. Salmon from condemned tuberculous animals was over one million dollars annually.

Since June 30, 1906, much more than a million has been lost, and before another year has passed an additional million will be at a dead loss, and nothing is accomplished by it.

I believe in making scientific, harmless, economic use of the meat for a short period, and thus convert this dead loss into a working power for the eradication of the disease forever.

This would result in making every single pound of meat and dairy produce forever in the future come from animals absolutely free from tuberculosis.

Without egotism I claim a hearing for these views, and firmly and sincerely believe that no proposition has ever been made so far-reaching as this in behalf of the wealth, health and happiness of the people. It is radically simple, radically rapid, and radically economical, and is not antagonistic to a single soul on earth.

I want you to study it thoroughly and improve on it where you can.